September 12, 2005

MEMORANDUM FOR ASSISTANT SECRETARY OF DEFENSE FOR NETWORKS AND
INFORMATION INTEGRATION/CHIEF INFORMATION
OFFICER (NII/DoD CIO)
DIRECTOR, OPERATIONAL TEST AND EVALUATION
DEPUTY ASSISTANT SECRETARY OF THE ARMY (RESEARCH
AND TECHNOLOGY)
CHIEF OF NAVAL RESEARCH
DIRECTOR, TEST AND EVALUATION AND TECHNOLOGY
REQUIREMENTS, DEPARTMENT OF THE NAVY
DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE
(SCIENCE, TECHNOLOGY AND ENGINEERING)
DIRECTOR, BALLISTIC MISSILE DEFENSE ORGANIZATION
DIRECTOR, DEFENSE ADVANCED RESEARCH PROJECTS
AGENCY
DIRECTOR, DEFENSE THREAT REDUCTION AGENCY
DIRECTOR, TEST AND EVALUATION MANAGEMENT
AGENCY, DEPARTMENT OF THE ARMY
DIRECTOR, TEST AND EVALUATION DIRECTORATE,
DEPARTMENT OF THE AIR FORCE
COMMANDER, U. S. JOINT FORCES COMMAND

SUBJECT: Nominations for Computational Technology Area (CTA) Leaders

I solicit your nominations for government personnel able to serve as computational technology area leaders in the DoD High Performance Computing Modernization Program (HPCMP).

The HPCMP was initiated in 1992 in response to congressional direction to modernize the DoD laboratories' high performance computing (HPC) capabilities. The HPCMP was assembled out of a collection of small high performance computing departments, each with a rich history of supercomputing experience that had independently evolved within the Army, Air Force, and Navy laboratories and test centers. Today the HPCMP provides the supercomputer services, high-speed network communications, and computational science expertise that enables the Defense laboratories and test centers to conduct a wide range of focused research, development, and test activities. This partnership puts advanced technology in the hands of U.S. forces more quickly, less expensively, and with greater certainty of success. Today's weapons programs, such as the Joint Strike Fighter, Unmanned Aerial Vehicles, Medium Tactical Vehicle Replacement, and the Javelin Missile program, have benefited through innovative materials,

advanced design concepts, improved and faster modification programs, higher fidelity simulations, and more efficient tests. Future weapons systems, such as radio frequency weapons, the airborne laser, DD(X) and the Army's future combat system, are benefiting through basic and applied research in plasma physics, turbulence modeling, molecular engineering, high-energy materials, and advanced signal processing.

The HPCMP organizes its user base into ten computational technology areas (CTAs). Each of the program's CTAs is led by a notable scientist or engineer who serves as a DoD functional area point of contact. The CTA leaders invest significant time and expertise in fulfilling their duties; concomitantly, their influence in shaping DoD strategy on computational science is significant. Our CTA leaders represent the top tier of the DoD's scientific and engineering communities. They must command the respect of their peers and have the support of their management to effectively serve their technical communities as CTA leaders.

I solicit your nominations for CTA leaders in the following disciplines:
1. Electronics, Networking, and Systems/C4I
2. Environmental Quality Modeling and Simulation
3. Forces Modeling and Simulation
4. Integrated Modeling and Test Environments
5. Signal/Image Processing

A description of the above computational technology areas is attached to this memorandum. Also attached is a description of the roles and responsibilities for CTA leaders.

Please provide your nominations, prioritized by CTA, to Mr. Cray Henry no later than November 18, 2005. Address your nomination package to:

Director, HPCMP
DoD High Performance Computing Modernization Program Office
1010 North Glebe Road, Suite 510
Arlington, VA 22201-4795

Your nomination package should contain for each nominee:
- contact information (including phone number and e-mail address);
- curriculum vita, with a list of publications;
- one recently published scientific or engineering paper;
- signed memorandum from the candidate's immediate supervisor and the candidate's laboratory, test center, or equivalent director, acknowledging support for the time and effort necessary to accomplish the responsibilities of a CTA leader.

If you wish to discuss this request further, Mr. Henry may be contacted at 703-812-8205 or by email at cray@hpcmo.hpc.mil. Additionally, your representative to the High Performance Computing Advisory Panel (list attached) can provide assistance.

//Signed//
Charles J. Holland
Deputy Under Secretary of Defense
  (Science and Technology)

Attachments:
As stated

cc:
HPC Advisory Panel
CTA Leaders
Challenge Project Leaders

COMPUTATIONAL TECHNOLOGY AREA DESCRIPTIONS

Electronics, Networking, and Systems/C4I (ENS)	This CTA focuses on the use of computational science in support of analysis, design, modeling, and simulation of electronics from the most basic fundamental, first principles physical level to its use for communications, sensing, and information systems engineering. Accordingly, ENS activity ranges from the analysis and design of nano-devices to command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) systems-of-systems. This focus ties together nano-electronics, acousto-electronics, micro-electro-mechanics, optoelectronics, photonics, circuits, and networks through the exploration of passive/active devices, detectors, emitters, and their physical integration and system deployment in a network-centric warfare environment. ENS methodologies have been developed to explore the nano-scale and below (e.g., electronic structure, charge transport, optical, and photonic interactions) as well as at the analog/digital circuit and communications, sensor and system level (e.g., data links and transport including signal propagation) for performance analysis of information warfare systems-of-systems and large tactical networks.
Environmental Quality Modeling and Simulation (EQM)	The Environmental Quality Modeling and Simulation CTA support the investigation of DoD impacts on the environment, and the impacts of this environment upon DoD activities. EQM technical activities involve the high-resolution modeling of hydrodynamics, geophysics, and multi-constituent fate/transport through the coupled atmospheric/land surface/subsurface environment, and their interconnections with numerous biological species and anthropogenic activities. Within DoD, this technology is used for concerns ranging from stewardship and restoration of natural and cultural resources on military installations to evaluation of the impacts of environmental conditions on the DoD mobility operations in the battlespace.
Forces Modeling and Simulation (FMS)	The FMS CTA focuses on the research and development of HPC-based physical, logical, and behavioral models and simulations of battlespace phenomenology in the correlation of forces. These simulations are applied to experimentation, training, operational planning, mission rehearsal, system analysis, and acquisition. The acquisition domain includes research and development, test and evaluation, and production and logistics. The FMS CTA also includes the modeling of command, control, systems that impact military decision making during war and operations other than war. A variety of techniques are employed, including parallel discrete event simulation, evolutionary methods, and agent-based simulations that exploit the power of HPC.
Integrated Modeling and Test Environments (IMT)	The IMT CTA addresses the application of integrated modeling and simulation tools and techniques with live tests and hardware-in-the-loop simulations for the testing and evaluation of DoD weapon components, subsystems, and systems in virtual and composite virtual-real environments. DoD application areas focus on multidisciplinary computational methods and real-time techniques. These areas include digital scene generation, six degrees of freedom trajectory simulations, real-time test data analysis and display systems for test control and evaluation, and other modeling and simulation integration tools requisite to high-fidelity engineering and closed-loop engagement models (one-on-one and few-on-few) for the simulation of weapon component subsystems and systems in a virtual operational context.

Signal and Image Processing (SIP)	The Signal/Image Processing CTA covers the extraction of useful information from sensor outputs in real time. DoD applications include surveillance, reconnaissance, intelligence, communications, avionics, smart munitions, and electronic warfare. Sensor types include sonar, radar, visible and infrared images, and signal intelligence (SIGINT) and navigation assets. Typical signal processing functions include detecting, tracking classifying, and recognizing targets in the midst of noise and jamming. Image processing functions include the generation of high-resolution low-noise imagery and the compression of imagery for communications and storage. The CTA emphasizes research, evaluation, and test of the latest signal processing concepts directed toward these embedded systems. Usually such processors are aboard deployable military systems and hence require hefty packaging, minimum size, weight, and power. System affordability is expected to improve an order of magnitude through the development of scalable codes running on flexible HPC systems. This will enable the traditional expensive military-unique 'black boxes' required to implement high-speed signal/image processing to be replaced by commercial-off-the-shelf HPC-based equipment.

COMPUTATIONAL TECHNOLOGY AREA LEADER
ROLES AND RESPONSIBILITIES

SUMMARY:

Serves as the principal advisor and senior technical assistant to the Department of Defense (DoD) High Performance Computing Modernization Program (HPCMP) in his/her technical area of expertise. The incumbent is a senior scientist/engineer expert in a particular computational discipline who provides advice and assistance in all areas directly related to his/her specific computational technology area of expertise and to the employment of high performance computing (HPC) assets toward accomplishing the DoD-wide user community's research, development, test and evaluation (RDT&E) missions. The CTA leader helps foster the effective use of HPC and serves as the discipline's HPC expert and the user community's primary representative, intermediary, and advocate.

The CTA Leader also serves as a member of the HPCMP CTA Advisory Panel (CTAAP). The panel, composed of CTA Leaders in key computational technology areas served by the HPCMP, is the premier advisory body to the Director in all matters related to computational science and the effective employment of high performance computing resources required by the user community. The CTAAP Charter is attached.

MAJOR DUTIES:

- Provides technical expertise to advise and assist the Director, HPCMP, in meeting the needs of the DoD user community.

    - Represents an assigned CTA user community as a whole, keeping aware of the needs of the DoD community with respect to HPC technology, and makes recommendations to the Director, HPCMP, on issues affecting his/her DoD CTA user community.

    - Keeps current on developments and trends in his or her respective computational science and on DoD, Service, and Agency policies, plans and requirements as they relate to DoD RDT&E and HPC.

    - Maintains in-depth knowledge of emerging HPC standards, state-of-the-art HPC systems and modern software engineering practices.

    - Routinely confers with colleagues in industry, academia, military services and other federal agencies (especially the DoD-wide RDT&E community) to identify, create, promulgate, and support opportunities for collaboration, and technology transfer.

- Works with other CTA leaders, DoD HPC Shared Resource Center personnel, DoD HPCMP Programming Environments and Training (PET) personnel, Director of Defense Research and Engineering staff, other DoD Services/Agencies and federal HPC managers, and academic HPC experts to ensure collaborations occur where appropriate and ensure DoD scientists and engineers have the ability to exploit HPC technology to accomplish their RDT&E missions.

- Assists in expanding and training the DoD high performance computing user base by fostering interest, facilitating collaboration and the sharing of expertise and solutions.
    - Educates the DoD HPC user community through a variety of means such as CTA web pages, success story publications, technical papers, presentations, peer reviews, and refereed journal articles.
    - Initiates, plans, coordinates, and conducts workshops and meetings with groups from the DoD user community, other federal agencies, and private industry to ensure maximum effectiveness and exploitation of HPC by intended users.
    - Initiates, directs, facilitates, and participates in various HPC and CTA-related meetings, reviews, software tests, conferences, workshops and seminars.
    - Promulgates to the user community information about ongoing or new HPCMP products – helps foster integration and use of newly developed products.

COMPUTATIONAL TECHNOLOGY AREA (CTA) ADVISORY PANEL (CTAAP) CHARTER

MISSION: To apprise the Director of the Department of Defense (DoD) High Performance Computing Modernization Program (HPCMP) and other senior DoD officials of the probable technical (science & engineering) impacts of potential HPCMP actions.

VISION: Enable a pervasive culture among DoD's scientists and engineers in which they routinely use advanced computational environments to solve the most demanding problems.

SCOPE: The CTAAP is empowered to advise the HPCMP Director and other senior DoD officials on the probable technical impacts of potential HPCMP actions on DoD's science and engineering challenges. At a minimum the CTAAP will:
- Assess the impact of HPCMP actions on the transformational strategy of the DoD.
- Appraise future investment strategies and priorities in development and sustainment of HPC software, implementation of HPC performance tools, training in state-of-the-art HPC technologies, procurement of HPC hardware, and connectivity of the HPC community.
- Identify and develop the computational opportunities for evolving DoD requirements.
- Promote science-based modeling and simulation within the DoD and in other relevant portions of the federal government.
- Make recommendations to the HPCMP Director on preferred actions the HPCMP could take to further DoD science and engineering objectives.

RESPONSIBILITIES: The CTAAP shall:
- Solicit for and/or provide information on specific topics as requested by the HPCMP Director, HPCMP Chief Scientist, or other person appointed by the Director.
- Serve as a forum for key scientists and engineers to make recommendations on policies and procedures, programming environment and training, hardware, software, and placement of equipment at the centers to address user requirements.
- Identify potential ramifications of programmatic decisions on DoD's scientific and engineering communities.
- Participate in the review of components of the HPCMP at the request of the Director.
- Share techniques, experiences, and knowledge of other programs that exploit HPCMP assets.

MEMBERSHIP:
- The CTAAP is composed of CTA Leaders who are selected by the Director, HPCMP based on a nomination and selection process.
- The Chairperson of the CTAAP is the Chief Scientist of the HPCMP or other person appointed by the Director.

Attachment 4
HPCAP Membership

MEETINGS: The CTAAP will meet as required, and will strive to meet at least three times per year. The CTAAP Chairperson will schedule meetings to help ensure broad participation. At least two weeks in advance of scheduled meetings, CTAAP members will provide to the Chairperson items to be included on the meeting agenda. Agendas will be distributed at least one week in advance to the HPCMP Director and the CTAAP members. The CTAAP Chairperson may open the meeting to invited guests. Minutes will be distributed to the HPCMP Director and to the members of the CTAAP within two weeks following each meeting.

COMMUNICATIONS: The CTAAP shall report annually to the HPCMP Director, and otherwise as requested by the CTAAP Chairperson concerning issues and opportunities, including any unresolved issues or disagreements with HPCMP policies and procedures which are judged to be detrimental to the scientific and engineering community's work on DoD technology problems. To encourage complete participation of CTAAP members, the use of electronic means of communication shall be encouraged. Web servers and other mass presentation methods will be used to convey information from the CTAAP to the HPCMP-serviced scientific and engineering community when appropriate.

AMENDMENTS: Amendments to this charter may be proposed by the Chairperson of the CTAAP and must be approved by the Director, HPCMP.